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Collapse of Fractal Structure in a Dynamic Fractional Stark Ladder Driven by an Intense THz Laser KEN-ICHI HINO, Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba, FUMITAKA OHNO, YUYA NEMOTO, Graduate School of Pure and Applied Sciences, University of Tsukuba, NOBUYA MAESHIMA, Division of Materials Science, Faculty of Pure and Applied Sciences, University of Tsukuba — We examine a dynamic Wannier-Stark ladder in biased semiconductor superlattices driven by a monochromatic THz laser with a fractional matching ratio η; this is the ratio of a Bloch frequency to a laser frequency. This type of a dynamic Wanneir-Stark ladder is termed a dynamic fractional Stark ladder (DFSL). It is known that a DFSL shows fractal structure in quasienergy levels as a function of $1/\eta$ based on a tight-binding model [1]. However, with the increase in intensity of an irradiated laser, it is found that photon-assisted tunneling causes single-channel shape-resonance with quasienergy shift and width, making inaccurate the above-mentioned fractal structure [2]; the channel means a photon sideband of DFSL. In present study, we investigate the resonance structure of DFSL involving stronger interchannel interactions relevant to ac-Zener tunneling by applying a multichannel scattering based on the R-matrix Floquet theory. The obtained results show that conspicuous redshift of resonance spectral peaks and the associated resonance decay, concluding the collapse of the fractal structure characteristic of DFSL. [1]X. -G. Zhao, et al., Phys. Lett. A 202, 297 (1995). [2]T. Karasawa, et al., Solid State Comm 151, 392 (2011).

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